Road Accident Cost, A-Case Study of Selected Stretch of S.G. Highway Ahmedabad

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Abstract— Road accident has become the major issue for all the developing countries of the world. The number of accident rate is increasing every year in all the developing countries of the world. There is severe loss of the lives and the property damage due to Road traffic injuries. The accident data analysis and their cost are calculated. In Indian context the traffic is hitrogenous in nature so rate of accident is increasing drastically. In this paper the study is up to Sanand circle to sola junction of selected stretch of S.G Highway Ahmedabad. The study of accident and the cost of the same are calculated with the help of GDP and VSL.

Key words: Road Accident Cost, S.G. Highway Ahmedabad

I. INTRODUCTION

Road accidents has become a major concern for every country now-a-days, considering its magnitude, negative impacts on the economy, public health and general welfare of people. One of the leading causes of increasing death rate and disabilities is increasing road accidents. Accident cost widely affects the nation's economy. The United Nations has rightly proclaimed 2011-2020 as the decade of action on road safety so that the present rising trends of road accidents stabilizes and is reversed by the year 2020.

In India the number of accidents recorded are too high than other countries of the world. During the year 2003, the total number of accidents was recorded as 4, 06,726 in which 85,998 people were killed and 4, 35,122 people were injured; According to the records in 2013, the total numbers of accidents were recorded as 4, 86,476 in which 1, 35,572 people were killed and 4, 94,893 were injured. Maximum accidents recorded since 2003-2013 were in the year 2010 in which 4, 99,628 accidents were recorded, but maximum number of people were killed because of road accidents in 2011, which was 1, 42,485. The proportion of fatal accidents has constantly increased since 2003 from 18.1% to 25.2% in 2013. Number of road accidents per lakh population was 21.2 in year 1970 which increased to 22.8 in year 1980. A sharp increment was seen 33.8 in 1990; between 2000-2005 fluctuation was in the range of 38.6 to 40.1 moving to 42.0 in 2007-2008. A slight dip to 41.9 was in 2009 again rose to 42.5 in 2010. Finally 38.9 were recorded in year 2013. Number of persons killed per lakh population was 2.7 in 1970 which increased to 11.8 in 2011 and declined thereafter to 11.0 in 2013. (MINISTRY OF ROAD TRANSPORT & HIGHWAYS, 2013)

II. CAUSES OF ACCIDENTS

A high economic cost of injuries and fatalities are occurring due to road accidents. There is a need of effective policies for curbing road accidents. The causes of accidents are fault of driver, fault of pedestrian, defect in condition of motor vehicle, defect in road geometric condition, defect in physical condition of a road, bad weather condition etc. According to one survey fault of driver is 78% and all other are below 10% where defect in road condition is only 1.4% in India. The above mentioned causes of accidents were recorded in year 2013. The main cause of accidents was exceeding lawful speed which was 55.6%. Intake of alcohol/drugs by the driver resulted into 5.3% of accidents. Overloading/overcrowding of a vehicle accounted 20.8% of road accidents in year 2013. Hit and run cases were above 10% in the year 2013. Defect in road such as geometrical error caused 0.8% whereas surface of road (potholes) caused 1.9% accidents. (Ministry of Road Transport & Highways, 2013)

III. LITERATURE REVIEW

According to (Dr.Dhingra, 2009) a Accident cost should be calculated by taking Cost of minor injuries, Cost of major injuries, Cost of property damaged and Cost of fatalities. According to (Miller, 2004) the VSL (Value of statically life) for India which is to be calculated through GDP (Gross domestic product) is 42000 in 1996 for GDP of 379 .Cost of minor and major injuries to be calculated with the help of VSL. According to (Dr. S.K.Khanna, 2011) the accident analysis of the data collected can be done by calculating the fatal minor injuries major injuries in all the year and maximum fatal, major injuries, minor injuries

IV. OBJECTIVES

1) To find out accident cost occurring on the selected stretch using GDP and VSL.
2) Accident analysis

V. METHODOLOGY

As stated above the objective of the studies based on that literature is studied, on basis of that secondary data collection of accident from police department is carried out. Taking the base of the data analysis of the data is carried out of accident and cost of accident is calculated. Conclusion is carried out on basis of data analysis. The methodology is d

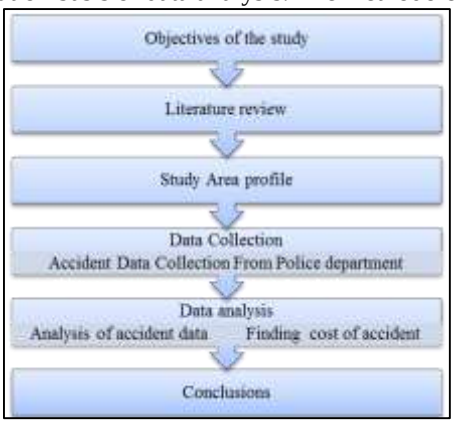

Fig. 1: Methodology

VI. STUDY PROFILE

A case study of S.G Highway Ahmedabad is taken from Sanand Circle to Sola Junction is taken for the study. Ahmedabad, located at the western side of the state of Gujarat, is situated on the banks of the river Sabarmati, situated at 23° 03' latitude N and 72° 40' E, longitude 30 km (19 mi) from the state capital Gandhinagar. The land use of the stretch in concern mainly comprises of commercial activities along its route with vacant land at both sides promising future growth of urban area. Residential and public buildings comprise about 40% of the total land use. Industries are negligible with very less (not more than 1%) space allotted for steel factories.

Figure 2 is showing whole study area stretch in that a) is showing Gujarat in reference of India b) is showing Ahmedabad in state of Gujarat c) is showing the road map of Ahmedabad and d) is showing selected study area.

Fig. (a): Gujarat with reference to India

Fig. (b): Ahmedabad in state of Gujarat

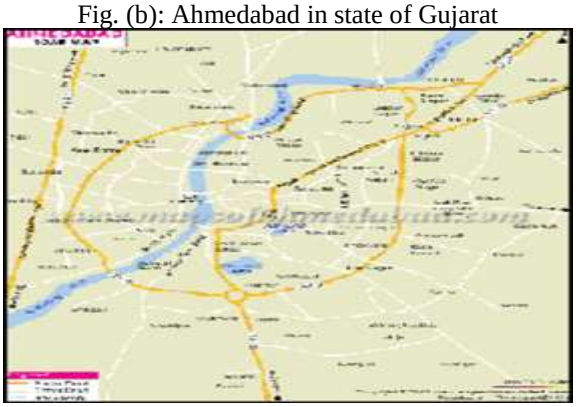

Fig. (c): Road map of Ahmedabad

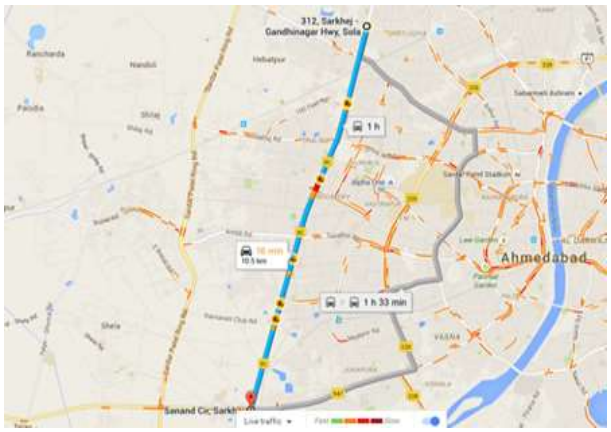

Fig. (d): Selected stretch under study

Fig. 2: Study area profile

VII. ACCIDENT DATA ANALYSIS AND ACCIDENT COST

The data was collected from four police station name of police station are Sarkej police station, Satellite police station, Vastrapur police station and Sola police station and some of the data from commisner's office. The data is arranged in chronological order and represented in the table 1 it shows the fatal data, minor injuries data, and major injuries data.

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Year	Fatal	Major injury	Minor injury
2006	58	108	368
2007	44	110	482
2008	48	112	452
2009	49	98	388
2010	63	93	286
2011	54	87	257
2012	62	94	366
2013	46	76	297
2014	59	89	459

Table: 1 Accident Data

Fig. 3: Accident trends over year

Source: Police Department Ahmedabad (Sola, Sarkej, Vastrapur, Satellite)

The maximum no. of fatal accidents was observed in the year 2010 which is 63. Same as minor injuries are 112 and major injuries 482 were in the 2008 and 2007 respectively.

IX. COMPUTATION OF ACCIDENT COST

Formula for computation is done on the basis of (Dr.Dhingra, 2009) in which they have given composition of accident cost in calculation of the cost. The parameters are cost of fatal, cost of minor injuries, cost of major injuries, and cost of property damage According to (Miller, 2004) the VSL (Value of statically life) for India which is to be calculated through GDP (Gross domestic product). The relation between GDP and VSL is assumed linear based on growth of GDP value of VSL extrapolated as shown in table2

Where, CA=Total cost of accident, VSL= Value of statistical life

Year	GDP	VSL(in lakh)
1996	379	0.42
2006	949	1.25
2007	1239	1.64
2008	1224	1.62
2009	1365	1.8
2010	1708	2.25
2011	1835	2.42
2012	1831	2.42
2013	1861	2.45
2014	2050	2.7

Table 2: GDP and VSL (2006-2014)
Source: (www.tradeindiaeconomics.com/analytical/plans.aspx?source=chart), (Miller, 2004)

The cost of accident (CA) is calculated using relation below:

CA=VSL × Total No. of fatal + 0.75VSL × Total no. of Major Injuries + 0.5VSL × Total No. Of Minor Injuries + Cost of property damaged

Cost of minor injuries and major injuries assumed to be 50% and 75% respectively. Cost of property damage is calculated by taking 50% of all the cost. Here WPI is not taken for the calculation as WPI is inflated value depending on the price of the market where GPD is more reliable than WPI. The total accident cost calculated is shown in table 3

Year	Fatal	Major Injury	Minor Injury	Property damage	Total
2006	72.5	101.3	230.0	353.1	756.9
2007	72.2	135.3	395.2	535.1	1137.8
2008	77.8	136.1	366.1	511.9	1091.9
2009	88.2	132.3	349.2	503.6	1073.3
2010	141.8	156.9	321.8	542.0	1162.4
2011	130.7	157.9	311.0	520.6	1120.2
2012	150.0	170.6	442.9	678.2	1441.7
2013	112.7	139.7	363.8	546.4	1162.5
2014	159.3	180.2	619.7	869.1	1828.2

Table 3: Accident cost (in lakh)

X. CONCLUSION

The maximum no. of fatal was there in the year 2010 which is 63. Same as minor injuries (112) and major injuries (482) were in the 2008 and 2007 respectively. The total accident cost is maximum in year 2014 that is Rs 1828.2 lakh the cost of fatal, cost of minor injuries, cost of major injuries, and cost of property damage were higher in the year 2014.

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